Center Independent Research & Development: GSFC IRAD

An Adaptive Langmuir Probe for CubeSats and Explorers

Completed Technology Project (2013 - 2015)

Project Introduction

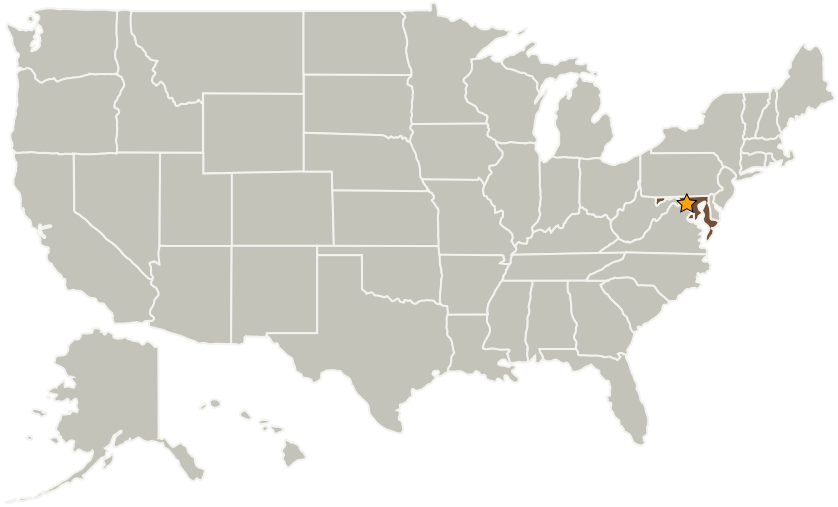
We propose to build an Adaptive Langmuir Probe (ALP) for CubeSats designed to mitigate spacecraft charging unique to small platforms.

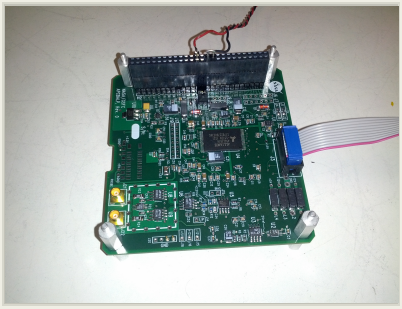
This project builds a new controlling circuit for Langmuir probes that can be applied toward CubeSats, explorers, and sounding rockets. The small surface area of new satellite platforms such as CubeSats relative to the probe collection surface requires that the range of swept voltages be more limited than typically used in sounding rocket and explorer-class missions. The project leverages the existing Langmuir Probe design from recent sounding rocket efforts (VISONS, EVEX, Dynamo) while adding feedback mechanisms to allow the circuit to determine the best range of voltages to sweep over. An end-to-end test of the probe and circuit will be conducted in a simulated space plasma inside a thermal vacuum chamber.

Anticipated Benefits

This project benefits unfunded and planned CubeSat and sounding rocket missions.

Primary U.S. Work Locations and Key Partners





Prototype ALP circuiboard

Table of Contents

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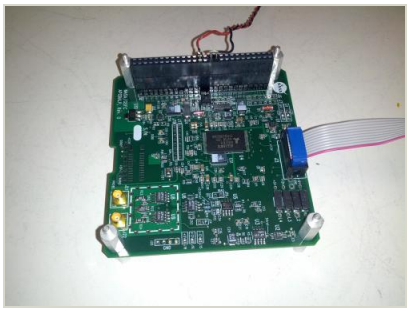
Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Naval Research Laboratory(NRL)	Supporting Organization	US Government	Washington, District of Columbia

Primary U.S. Work Locations	
District of Columbia	Maryland

Images



An Adaptive Langmuir Probe for CubeSats and Explorers Project (ALP)
Prototype ALP circuiboard
(https://techport.nasa.gov/image/4025)

Project Website:

http://sciences.gsfc.nasa.gov/sed/

Organizational Responsibility

Responsible Mission Directorate:
Mission Support Directorate (MSD)

Lead Center / Facility:
Goddard Space Flight Center (GSFC)

Responsible Program:
Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:
Peter M Hughes

Project Manager:
Nikolaos Paschalidis

Principal Investigator:
Jeffrey H Klenzing

Co-Investigators:
Robert F Pfaff
Paulo F Uribe
Douglas E Rowland

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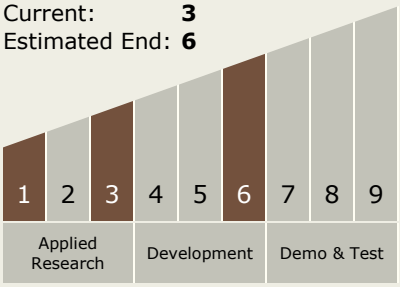
Completed Technology Project (2013 - 2015)

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **6**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.1 Field and Particle Detectors